Sanitary Sewer Clean-Out will be measured and paid per each. No measurement or payment of service lines will be made.

Payment will be made under:

Pay Item	Pay Unit
__" Sanitary Gravity Sewer	Linear Foot
__" Force Main Sewer	Linear Foot
Sanitary Sewer Clean-Out	Each

SECTION 1525
UTILITY MANHOLES

1525-1 DESCRIPTION

Provide utility manholes on water and sanitary sewer lines.

1525-2 MATERIALS.

Refer to Division 10.

Item	Section
Brick	1040-1
Concrete Block	1040-2
Curing Agents	1026
Gray Iron Castings	1074-7(B)
Mortar	1040-8
Portland Cement Concrete	1000
Precast Concrete Units	1077
Reinforcing Steel	1070
Select Material	1016
Steps	1074-8
Structural Steel	1072

Use precast concrete manholes with monolithic bottoms which conform to ASTM C478, AASHTO M 199 and are as shown in the plans or in *Roadway Standard Drawings*. Use ASTM C443 gaskets or AASHTO M 198 flexible sealants for joints between precast manhole sections. Use resilient connectors for piping conforming to ASTM C923. Use ASTM A48, Class 35 cast iron or Grade 60 steel reinforcement steps with polypropylene plastic coating.

Use manhole frames and covers made of cast iron conforming to ASTM A48 Class 35, which are traffic bearing, have machined contact surfaces and are sized as shown. Use covers with two 1" diameter air vents for vented manholes and use solid, non-vented covers with gaskets for watertight installation. Use covers with “Sanitary Sewer” or “Water” cast in large letters as appropriate for the type of utility.

Use an approved, nonshrink cement grout. Contact Materials and Tests Unit for a list of approved packaged grouts.

1525-3 CONSTRUCTION METHODS

Apply Section 1505 for excavation, trenching, pipe laying and backfill.

Make connections of pipe to manholes in cored or precast holes using a resilient connector. Use horseshoe type holes only when approved. For horseshoe type holes wrap the pipe with a butyl rubber gasket and fill the space between the pipe and manhole with a non-shrinking grout.

Provide an outside drop assembly on manholes for sewer pipes entering with 2.5 ft or more vertical drop. Inside drop assemblies may be used for connections to existing manholes when the drop exceeds 5 ft and the manhole diameter is greater than 4 ft.

In sewer manholes over 3 ft in depth, provide steps spaced 16" on center. Install steps in line with the effluent opening unless otherwise specified.

Construct invert channels to confine and direct the flow through sanitary sewer manholes. Use smooth finished invert channels that provide easy transition from inlet to outlet. Finish the benches or shelves to a non-slip texture and slope toward the invert channel. Precast invert channels are recommended but not required.

On deep manholes, a transition type manhole may be used provided there is at least 6 ft from the manhole bench to the transition cone.

Construct manholes with the top of the cover as shown in Table 1525-1.

TABLE 1525-1
MANHOLE CONSTRUCTION

Location	Top height above finished grade
Roadway pavement, Driveways, Sidewalks, Parking lots	Flush ± 1/4"
Vehicle Recovery Area	Flush ± 3"
Manicured Areas, such as lawns	Flush to + 2" with concrete pad
Flood Zones less than 3 ft above finished grade	1 ft above 100 year flood elevation
Flood Zones greater than 3 ft above finished grade	2 ft above finished grade with watertight frame and cover and vent pipe to 1 ft above 100 year flood
Other areas	2 ft above finished grade

For manholes installed before finished grading or paving, construct the top flush with the current grade to provide access during all phases of construction and adjust as grading and paving work progresses in accordance with Section 858.

(A) Cast-In-Place Concrete, Brick and Block Masonry

Construct concrete manholes in accordance with Section 825 with an ordinary surface finish. Construct brick masonry in accordance with Section 830. Furnish and place reinforcing steel in accordance with Section 425. Construct block masonry in accordance with Section 834 except that reinforcing will not be required.

Where necessary to fit field conditions, vary the dimensions of the manhole and footings as directed.

(B) Installation of Precast Units

Assemble precast manhole units in accordance with the manufacturer's instructions and grout together to form a sound structural unit. Fill all lifting holes with non-shrink grout. Where it is necessary to use cast-in-place, brick masonry or block masonry construction as part of the structure, apply Subarticle 1525-3(A) to such construction.

(C) Fittings and Connections

Where fittings enter the manhole, place them as the work is built up, thoroughly bonded and accurately spaced and aligned.

Make pipe connections so that the pipe does not project beyond the inside wall of the manhole and grout smooth and uniform surfaces on the inside of the manhole.

Set metal frames for covers in full mortar beds and mechanically secure by an approved method.

(D) Testing

Vacuum test all manholes before grouting and backfilling. Test according to ASTM C1244.

1525-4 MEASUREMENT AND PAYMENT

The height of the manhole will be measured and paid to the nearest tenth of a foot from the inside bottom (invert) of the manhole to the final finished top of the manhole ring.

Utility manholes will be measured and paid by appropriate diameter per each for manholes of 0 to 6 ft height and per linear foot of height over 6 ft. No additional payment will be made for adjusting manholes to finished grade.

Drop assemblies will be incidental to the work being performed.

Payment will be made under:

Pay Item	Pay Unit
__' Dia Utility Manhole	Each
Utility Manhole Wall __' Dia	Linear Foot

SECTION 1530
ABANDON OR REMOVE UTILITIES

1530-1 DESCRIPTION

Abandon or remove utility facilities.

1530-2 MATERIALS

Refer to Division 10.

Item	Section
Flowable Fill	1000-6
Portland Cement Concrete	1000
Select Materials	1016

1530-3 CONSTRUCTION METHODS

Apply Section 1505 for excavation, trenching, pipe laying and backfill.

(A) Abandoning Pipe

Abandon utility pipes shown in the plans or designated by the Engineer by emptying the pipeline contents and plugging the ends with grout or flowable fill. Prepare grout to a consistency that will flow and be vibrated in order for the mix to flow uniformly into the pipe to be filled. Use the construction methods in Article 340-3.

Fill or remove the following abandoned utility pipes:

(1) Pipe larger than 24".

(2) Pipe located within the roadway typical section or the project slope stake line and one of the following:

(a) Pipe 12" to 24" diameter located less than 20 ft below finished grade.

(b) Pipe 6" to 12" diameter located less than 12 ft below finished grade and not made of cast iron, ductile iron, HDPE or PVC.

(c) Located below groundwater table that could become a conduit for water movement.